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QUICK CONNECTING DEVICE FOR DUCTS IN MOTOR VEHICLES

The present application for a Patent of Invention refers to a quick connecting device for ducts in motor vehicles which novel manufacturing, conformation and design features fulfil the purpose to which it has been specifically conceived, with a maximum safety and effectiveness and with many advantages, as will be fully disclosed hereinafter in the present specification.

More particularly, there is provided a quick connecting device for ducts in motor vehicles which is intended for the quick connection of a first duct end to a second duct end. The quick connecting device of the invention is intended particularly, but not exclusively, to connect the air cooling duct to the turbo outlet duct of the motor vehicle engine.

Standardization in the turbo outlet duct end of the engine (second duct hereinafter) on the part of each manufacturer makes it to be necessary designing a quick connecting device particularly and accurately adapted to manufacturing requirements. As a general rule, the second duct, particularly sized according to each manufacturer, is provided with a coupling end (referred herein to as male member) wherein said air cooling duct is to be coupled (first duct hereinafter) through a quick connecting device. Said coupling end of the above mentioned second duct is adapted for snugly receiving a fastening clip which purpose is to hold in place the first and the second ducts through said quick connecting device.

Quick connecting devices currently being manufactured for this purpose are formed basically of a female bush-like tubular body associated with said first duct, that is, with the air cooling duct coming out from the turbo of the motor vehicle engine. The inner surface of said female bush is suitably adapted to fit the outer surface of said second duct end (that is to say, the male

member). Said male member has a peripheral groove where a sealing o-ring is received.

When assembled, the first duct end (female member) is attached to said tubular body (male member) that
5 is fitted therein so that the female member covers said circumferential groove of the male member.

The female member, that is, the first duct end, has typically a groove complementary to the groove of the male member to allow coupling of the fastening clip.

10 Although the design of these coupling devices is advantageous in the sense that an easy and comfortable coupling in assembly, maintenance and repair operations of the ducts being connected is achieved, however it has been
15 found in practice that the working conditions that the connecting device is subjected (high temperatures and vibrations) result in many connecting faults. In particular, it has been found that the female member is usually broken since, as stated before, vibrations to which it is subjected in conjunction with the high temperatures
20 to which it is also subjected result in expansion of the circumferential groove thus forming a crack leading to fatigue cracking of the coupling end of the cooling duct (first duct). This problem has forced users using said connecting system to take their motor vehicles for
25 repairing so that said quick connecting device is duly replaced for a new one.

Later attempts have been carried out for overcoming these problems. One of the proposed solutions at present for reducing the possibilities of breakage of the
30 connecting device consists, for example, in increasing the wall thickness in the connecting area, specially in the connecting area where the circumferential groove of the female member is formed, that is the area where the breakage of the device begins. However, machining
35 difficulties for obtaining the final piece with this

increased thickness at a given area and the increase of material required result in a considerably increased cost of said device.

5 The invention provides a new quick connecting device such that overcoming said disadvantages is made possible, keeping the advantages of the quick connection of the first and the second ducts.

10 Therefore, the quick connecting device of the present invention does not use the previously described configuration in connection with the prior art and it has a novel configuration, which is perfectly adapted to the standards provided by the manufacturer regarding the second duct end (male member) (engine turbo outlet).

15 The quick connecting device of the invention comprises a bush-like body (female member) associated with a first duct. The term "associated" as used herein means that the female member may be either coupled by any suitable means to said first duct or it may be integral thereto.

20 The inner surface of said bush or female member is adapted for receiving a second duct end (male member). This male member, associated with the second duct, has a circumferential groove on the outer surface thereof. When assembled, the female member, that is to say, the first
25 duct end, extends to the male member but without covering said circumferential groove thereof.

30 The surface of the female member end is provided with two outer protrusions forming respective inner recesses adapted for receiving sealing gaskets. This double-inner recess configuration of the female member allows arranging a first sealing gasket and a second locking gasket between the male member and the female member to ensure a tighter and more effective connection.

35 Causes of breakage of the connecting device are therefore eliminated by the invention by successfully

eliminating connection faults between the ducts.

Axial retention of the male member regarding the female member is carried out by means of a fastening clip comprising substantially two U-shaped coupling members. One
5 of said coupling members is fitted into the outer circumferential groove of the bush while the other is fitted into the outer groove defined between said protrusions in said female member end.

A very effective quick connecting device with a
10 long working useful life is therefore obtained, thus withstanding well the working conditions in the motor vehicle engine, with a very reduced cost.

The features and the advantages of the present invention will be clearer from the description of a
15 preferred embodiment than will be given by way of a non limitative example. This description is given hereinafter in connection with the drawings, in which:

Fig. 1 is a perspective view of the male bush associated with the second duct;

20 Fig. 2 is a cutaway elevational view of the male member in fig. 1;

Fig. 3 is a perspective view of the female member associated with the first duct;

25 Fig. 4 is a cutaway elevational view of the female member of the first duct in fig. 3;

Figs. 5 and 6 are perspective views showing the fastening clip as seen from the front and the back, respectively;

30 Fig. 7 is an elevational view showing the male member fitted into the female member of the first duct;

Fig. 8 is an elevational view of a longitudinal cross-section of the assembly in fig. 7 shown in its assembled condition;

35 Figs. 9 and 10 are perspective views showing the assembly in fig. 7 in its assembled condition as seen from

the front and the back, respectively; and

Fig. 11 is a perspective view in which the different parts forming the quick connecting device for ducts in motor vehicles of the invention are shown in its
5 disassembled condition to see the assembly sequence thereof.

According to the figures attached in the present specification, an example of a quick connecting device according to the present invention is now described. In the
10 specific example shown in the figures, the device is intended for connecting the cooling air duct (first duct) to the turbo outlet duct of the motor vehicle engine (second duct). Both ducts have not been shown since they are not the object of the invention.

15 The first and the second ducts are coupled to each other and they are not allowed of being axially displaced, said coupling being tight because of the device of the invention, which will be fully described below.

The device of the invention basically comprises a
20 bush-like body (60) (female member hereinafter) adapted for receiving a second duct end (50) (male member hereinafter) therein.

This female member (60) has one end (65) for coupling with the male member (50) and one end (66) for
25 connection with the first duct. This connection with the first duct may be carried out either by any conventional means or it may be integral thereto.

The female member (60) is provided, in the outer surface thereof, with a circumferential groove (61) defined
30 by two outer parallel protrusions (62, 63), as it can be seen from the view in fig. 4. These parallel protrusions (62, 63) are capable of receiving respective gaskets (65, 66) therein, as shown in fig. 8. Therefore, by providing two gaskets (65, 66), one acts as a sealing gasket and the
35 other one acts as a locking gasket, thus ensuring a tight

and effective connection.

The device is adapted for snugly receiving a fastening clip referenced by (100) which configuration can be seen from figs. 5 and 6 of the drawings herein attached.

5 The male member (50) has one end (52) for connection with the female member (60), through its respective connection end (65) and one end (53) for connection with the second duct, that is to say, the turbo outlet duct of the motor vehicle engine. The male member
10 (50) is further provided, on the outer surface thereof, with a circumferential groove (51) adapted for receiving said fastening clip (100).

From its assembled condition shown in figs. 7 to 10 of the drawings, it may be seen how the female member
15 (60) extends to the outside of the male member (50) without covering said circumferential groove (51) of the male member (50), as opposed to prior art devices. This particularity is clearly shown in the cutaway view in fig. 8, in which it may be seen that the end portion of the
20 female member (60) does not cover the circumferential groove (51) of the male member (50). The purpose of such design is eliminating the possibilities of breakage of the female member (60) and thus ensuring the connection between the ducts.

25 As it can be seen from figs. 5 and 6, the fastening clip (100) comprises a single member suitably shaped to define two substantially U-shaped coupling members (101, 102). One of said coupling members (101) is adapted to be fitted into the circumferential groove (51)
30 of the male member (50) while the other coupling member (102) is adapted to be fitted into the outer groove (61) defined between said protrusions (62, 63) of the female member (60) of the first duct, as it can be seen from fig. 4.

35 The device of the invention is shown in its

assembled condition in fig. 10, and in the exploded view of
fig. 11 it is shown in its disassembled condition. Said
fig. 11 shows how the male member (50) has to be fitted
into the female member (60) for subsequently assembling the
5 fastening clip (100), the assembly being as shown in figs.
7, 8 and 9.